

UNIVERSITI TEKNOLOGI MARA

**WATER QUALITY CHARACTERISTICS AND
PROFILES IN A DEVELOPING URBAN
CATCHMENT**

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ABSTRACT

Increasing development and urbanization have made urban runoff a major problem both from the perspective of the flow quantities and qualities. The quantities and qualities of urban runoff depend on catchment characteristics. In Malaysia, urban drainage systems are designed to convey excess water to receiving water bodies such as lakes and rivers during wet weather flows. However, there is significant flow during dry weather due to discharges of grey water from residential, commercial and construction premises. This study focuses mainly on establishing pollutant characteristics and profiles in an urban drainage system for a developing catchment under dry weather flow condition. A 587.7 m drainage stretch in Section 7, Shah Alam was selected as the study stretch. The study subcatchment consists of housing areas, construction sites and also green areas. Samples were collected manually and were analysed in accordance to Standard Methods 1998. Collected samples were analysed for pH, temperature and also concentrations of organics, anions, cations and heavy metals elements. From the study, the pollutant concentrations ascertained were not normally distributed. The ranges established were pH (7.27-8.39), temperature (31-34.3°C), organic pollutants (5-50 mg/L), anions (0-34.844 mg/L), cations (0-13.618 mg/L) and heavy metals (0-1.352 mg/L). There were four pollutant profiles observed, i.e., decrease of pollutants concentrations at the middle point and increase towards the last point, pollutants concentrations increased at the middle point but decreased as it reached the last point, the concentrations of pollutants increased along the study stretch and pollutants concentrations decreased through out the study stretch. It was found that, only lead and cadmium concentrations will lead to further deterioration of Sungai Klang; and the pollutant trend depends on concentrations of pollutants in the mainstream and water discharging through inlets.

Keywords: dry weather flow, pollutant characteristics and profiles, urban drainage

Candidate's Declaration

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

In the event my thesis be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

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TABLE OF CONTENTS

TITLE PAGE	i
ABSTRACT	ii
CANDIDATE'S DECLARATION	
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	ix
CHAPTER 1: INTRODUCTION	
1.1 Background of Study	1
1.2 Problem Statement	3
1.3 Objectives of Study	4
1.4 Scope of Work	5
1.5 Significance of Study	7
1.6 Limitation of Study	7
CHAPTER 2: LITERATURE REVIEW	
2.1 Introduction	8
2.2 Present State of Environment	9
2.2.1 River Quality	9
2.2.2 Regulations and Legislations	11
2.3 Pollutant Characteristics	12
2.4 Catchment Characteristics	13
2.4.1 Developed Catchment	15
2.4.2 Developing Catchment	15
2.5 Weather Conditions	16
2.5.1 Dry Weather	17
2.5.2 Wet Weather	17

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Rapid development and urbanisation had reduced the capacity of a catchment to absorb the rainfall leading to greater volumes ending up as surface runoff. As a result, many locations in Malaysia have suffered from flood problems during the heavy downpour. The problem is made worse due to under designed or poorly maintained drainage systems. In order to avoid flood events, drainage systems in catchments must be adequately designed and maintained.

Urban runoffs constitute major problems not only from quantitative aspects but more important from qualitative aspects (Gromaire-Mertz, 1999). Concentrations of pollutants carried by surface runoffs are strongly related to the type of land use. Excess water, either in the form of surface runoff or wastewater is discharged into drainage systems, which is conveyed downstream to receiving water bodies. These water bodies include lake and rivers. Pollutants carried by surface runoff or wastewater include organic and inorganic matters that are harmful to humans and degrade the environment (Choe *et al.*, 2002). These pollutants if not monitored will lead to deterioration of the aquatic environment (Yusop *et al.*, 2005). Furthermore, they pose health risk to human as these pollutants may be introduced to humans through ingestion of aquatic life that bio-accumulate the pollutants. Therefore, it is no longer sufficient to consider the capacity or the volume of water that a drainage system should cater for but it is also important that studies on urban drainage systems emphasise on water quality aspects as well.